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Usage of virtual research laboratory "Climate" prototype for Northern Eurasia climatic and ecological studies

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Reported are some results of Northern Eurasia regional climatic and ecological monitoring and modeling obtained using recently developed prototype of thematic virtual research laboratory (VRL) Climate (http://climate.scert.ru/). The prototype integrates distributed thematic data storage, processing and analysis systems and set of models of complex climatic and environmental processes run on supercomputers. Its specific tools are aimed at high resolution rendering on-going climatic processes occurring in Northern Eurasia and reliable and found prognoses of their dynamics for selected sets of future mankind activity scenario. Currently VRL integrates on the base of geoportal the WRF and «Planet Simulator» models, basic reanalysis, meteorological stations data and support profound statistical analysis of storage and modeled on demand data. In particular, one can run the integrated models, preprocess modeling results data, using dedicated modules for numerical processing perform analysys and visualize obtained results. The prototype can provide specialists involved into multidisciplinary research projects with reliable and practical instruments for integrated research of climate and ecosystems changes on global and regional scales. With its help even a user without programming skills would be able to process and visualize multidimensional observational and model data through unified web-interface using a web-browser.

Location, frequency and magnitude of observed in Siberia extremes has been studied using recently added prototype functionality allowing detailed statistical analysis studies of regional climatic extremes. Firstly it was shown that ECMWF ERA Interim Reanalysis data are closest to near surface temperature time series measured at regional meteorological stations. Statistical analysis of ERA Interim daily temperature time series (1979-2012) indicates the asymmetric changes in distribution tails of such extreme indices as warm/cold days/nights. Namely, the warming during winter cold nights is stronger than during warm nights, especially over the north of Siberia. Increases in minimum temperatures are more significant than in maximum temperatures. Warming determined at the high latitudes of the region is achieved mostly due to winter temperature changes. South area of Siberia has slightly cooling during winter and summer.

In course of calculations carrying out the prototype automatically generates the archive of calculated fields of extreme temperatures anomalies ready for subsequent multidisciplinary studies of regional climate change impacts. The fields with detailed high spatial and temporal resolution climatic information also can be used by regional decision-makers for adaptation and mitigation measures elaboration.

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